Ashford and St. Peter's Hospitals
NHS Foundation Trust

Polycythaemia

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Guideline History		
Date	**Comments**	**Approved By**
2012	First edition of guideline	
2015	Review of guideline	
2022	Review and update by chairman's action	Chair, NGG (MSE)

Neonatal Intensive Care Unit

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Polycythaemia – Management of Symptomatic Neonate

This guideline is for the management of symptomatic neonates with polycythaemia. For asymptomatic neonates found incidentally to have a raised haematocrit (Hct) >65% take a free-flowing venous sample to re-check the haematocrit and monitor until the free-flowing haematocrit falls below 65%. Please read the guidance below for information and be aware that the haematocrit is likely to rise and peak around 8-12 hours of age.

Background:

Polycythaemia is a relatively common finding in the neonatal period. It is defined as an abnormally high ratio of red blood cells to plasma volume and therefore can be measured as a raised haematocrit. Most polycythaemic babies will not show clinical signs, therefore it is important to be aware of those babies at risk in order to monitor them and anticipate the associated problems of polycythaemia. Most babies who develop the clinical signs will present within 24hours as the haematocrit rises with the physiological decrease in plasma volume.

Measuring polycythaemia:

Below a haematocrit of 60% there is a linear relationship between viscosity and haematocrit. However, above this level there is an exponential rise in viscosity. Capillary sample haematocrits are often artificially high, so a free-flowing venous or arterial sample is the gold standard. Laboratory measurements of haematocrit and MCV are less reliable than spun samples due to the deformability of neonatal erythrocytes

At risk neonates:

Increased erythropoesis	Erythrocyte transfusion
IUGR	Maternal-fetal
Maternal diabetes	Twin-Twin
Neonatal thyrotoxicosis	Delayed cord clamping
Congenital adrenal hyperplasia	
Chromosomal abnormalities	

Clinical signs:

- Plethora or even cyanosis (sometimes only apparent when disturbed)
- Lethargy, poor suck, irritability, jitteriness
- Jaundice
- Hypoglycaemia
- Tachypnoea, tachycardia, heart failure

Possible sequelae:

Due to hyperviscosity microthrombi may form and may lead to

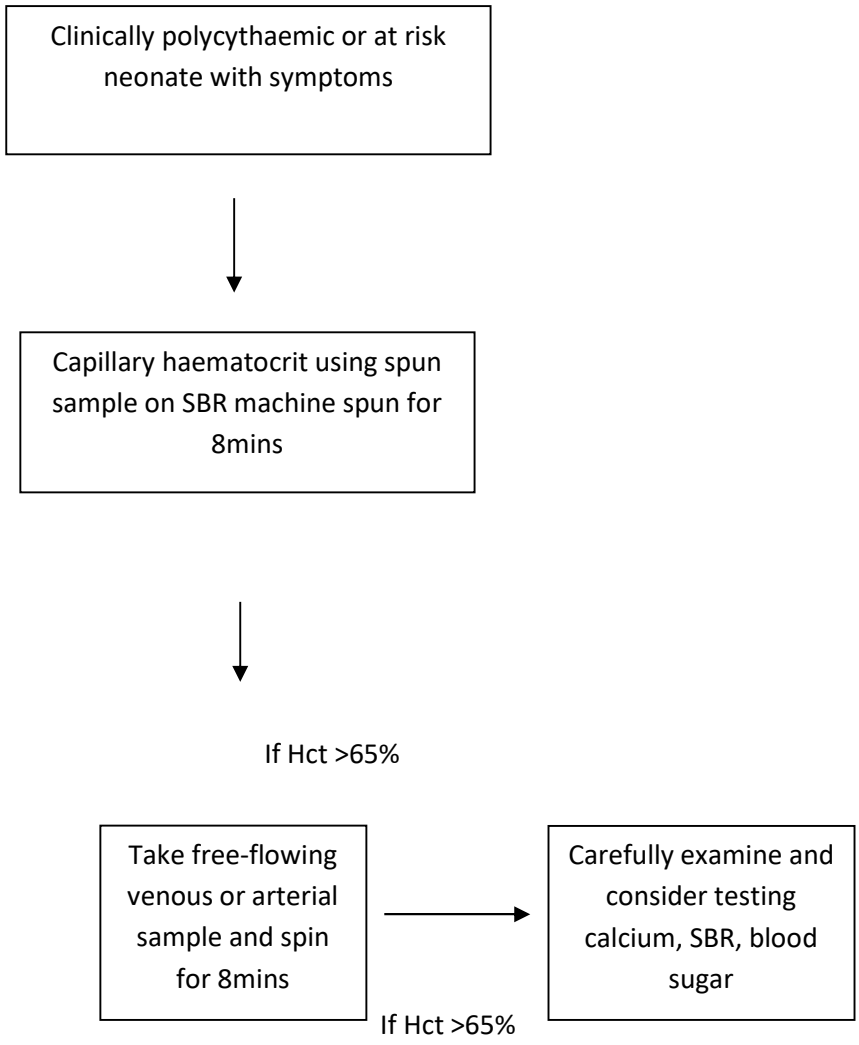
- Cerebral vascular occlusion,

- Renal vein thrombosis,

- Intestinal vascular occlusion

- Platelet consumption leading to thrombocytopenia

Management:



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- ★ If the haematocrit is between 65% - 70% a dilutional exchange unlikely to be needed but careful monitoring of spun haematocrit (Hct) will be necessary

- ★ If the haematocrit is >70% a dilutional exchange should be considered but discuss with the consultant first. There is no evidence of improved outcome and there is an increased risk of NEC, so the decision is based on the symptoms and potential for more serious complications

- ★ Maintenance fluids – normal maintenance fluids should be given (this can be normal milk volumes), ensuring that blood sugars are monitored and attended to. There is no evidence that giving "extra" fluids is helpful and may cause additional complications

Dilutional (partial) exchange: (After discussion with Consultant)

$$\text{Volume to be exchanged} = \text{Total blood volume} \times \frac{(\text{observed Hct} - \text{desired Hct (55)})}{\text{Observed Hct}}$$

e.g. 3kg baby with Hct 70%

= 3x 80ml/kg = 240ml

$$= 240 \times \frac{70-55}{70} \qquad \textbf{= 51ml}$$

It is necessary to have both arterial and venous access, preferably peripheral because polycythaemic babies are at greater risk of NEC. However, if there is an umbilical catheter already present this can be used, or if peripheral access is difficult.

Use a 3-way tap on the sampling side to take off the aliquots of blood and discard. Take off 10mls at a time, except in VLBW babies where 5mls should be taken at a time. Clearly document the volumes going in and out on the exchange transfusion chart. The process should take 30 minutes, therefore replace the fluid loss with 0.9% normal saline as an infusion to run at a corresponding rate.

Following the exchange take a repeat free-flowing haematocrit and a gas to measure the sodium, ionised calcium and glucose.

During/after this procedure continue to feed the baby as normal unless there are other concerns.

2. Supporting References

1. TMBU Neonatal protocol for polycythaemia. Royal Sussex County Hospital, Brighton. August 2006.

2. Sankar MJ, Agarwal R, Deorari A, Paul VK. Management of polycythemia in neonates. *Indian J Pediatr*. Oct 2010;77(10):1117-21.

3. Morag I, Strauss T, Lubin D, Schushan-Eisen I, Kenet G, Kuint J. Restrictive management of neonatal polycythemia. *Am J Perinatol*. Oct 2011;28(9):677-82.

4. Awonusonu FO, Pauly TH, Hutchison AA. Maternal smoking and partial exchange transfusion for neonatal polycythemia. *Am J Perinatol*. Oct 2002;19(7):349-54.

5. [Best Evidence] Dempsey EM, Barrington K. Short and long term outcomes following partial exchange transfusion in the polycythaemic newborn: a systematic review. *Arch Dis Child Fetal Neonatal Ed*. Jan 2006;91(1):F2-6.

6. Schimmel MS, Bromiker R, Soll RF. Neonatal polycythemia: is partial exchange transfusion justified?. *Clin Perinatol*. Sep 2004;31(3):545-53, ix-x.

7. Wong W, Fok TF, Lee CH, et al. Randomised controlled trial: comparison of colloid or crystalloid for partial exchange transfusion for treatment of neonatal polycythaemia. *Arch Dis Child Fetal Neonatal Ed*. Sep 1997;77(2):F115-8.

3. Supporting relevant trust guidelines

Neonatal Jaundice

Management of Hypoglycaemia

4. Guideline Governance

a. Scope

This guideline in relevant to all staff caring for babies across neonatal intensive care, transitional care and maternity.

b. Purpose

i. This guidelines aims to facilitate a common approach to the management of babies admitted under neonatal care. At times deviation from the guideline may be necessary, this should be documented and is the responsibility of the attending consultant.

ii. This guideline is subject to regular review to ensure ongoing evidence based practice.

c. Duties and Responsibilities

Health care professionals involved in the care of the newborn should be aware of the contents of this guideline

d. Approval and Ratification

This guideline will be approved and ratified by the Neonatal Guidelines Group.

e. Dissemination and Implementation

i. This guideline will be uploaded to the trust intranet 'Neonatal Guidelines' page and thus available for common use.
ii. This guideline will be shared as part of ongoing education within the Neonatal Unit for both medical and nursing staff.
iii. All members of staff are invited to attend and give comments on the guideline as part of the ratification process.

f. Review and Revision Arrangements

a. This policy will be reviewed on a 5 yearly basis.
b. If new information comes to light prior to the review date, an earlier review will be prompted.
c. Amendments to the document shall be clearly marked on the document control sheet and the updated version uploaded to the intranet. Minor amendments will be ratified through the Neonatal Guidelines Group. A minor amendment would consist of no major change in process, and includes but is not limited to, amendments to documents within the appendices.

g. Equality Impact Assessment

Background • Who was involved in the Equality Impact Assessment
Neonatal guidelines chair
Methodology • A brief account of how the likely effects of the policy was assessed (to include race and ethnic origin, disability, gender, culture, religion or belief, sexual orientation, age) • The data sources and any other information used • The consultation that was carried out (who, why and how?)
All staff and patient groups considered
Key Findings • Describe the results of the assessment • Identify if there is adverse or a potentially adverse impacts for any equalities groups
No evidence of discrimination
Conclusion • Provide a summary of the overall conclusions
Guideline fit for use
Recommendations • State recommended changes to the proposed policy as a result of the impact assessment • Where it has not been possible to amend the policy, provide the detail of any actions that have been identified • Describe the plans for reviewing the assessment
3 yearly review

h.

i.

j. Document Checklist

To be completed (electronically) and attached to any document which guides practice when submitted to the appropriate committee for approval or ratification.

Title of the document:

Policy (document) Author:

Executive Director:

		Yes/No/ Unsure/NA	Comments
1.	**Title**		
	Is the title clear and unambiguous?	**Y**	
	Is it clear whether the document is a guideline, policy, protocol or standard?	**Y**	
2.	**Scope/Purpose**		
	Is the target population clear and unambiguous?	**Y**	
	Is the purpose of the document clear?	**Y**	
	Are the intended outcomes described?	**Y**	
	Are the statements clear and unambiguous?	**Y**	
3.	**Development Process**		
	Is there evidence of engagement with stakeholders and users?	**Y**	
	Who was engaged in a review of the document (list committees/ individuals)?	**Y**	
	Has the policy template been followed (i.e. is the format correct)?	**Y**	
4.	**Evidence Base**		
	Is the type of evidence to support the document identified explicitly?	**Y**	
	Are local/organisational supporting documents referenced?	**Y**	
5.	**Approval**		
	Does the document identify which committee/group will approve/ratify it?	**Y**	
	If appropriate, have the joint human resources/staff side committee (or equivalent) approved the document?	**Na**	
6.	**Dissemination and Implementation**		

		Yes/No/ Unsure/NA	Comments
	Is there an outline/plan to identify how this will be done?		
	Does the plan include the necessary training/support to ensure compliance?		
7.	**Process for Monitoring Compliance**		
	Are there measurable standards or KPIs to support monitoring compliance of the document?	**N**	
8.	**Review Date**		
	Is the review date identified and is this acceptable?	**Y**	
9.	**Overall Responsibility for the Document**		
	Is it clear who will be responsible for coordinating the dissemination, implementation and review of the documentation?	**Y**	
10.	**Equality Impact Assessment (EIA)**		
	Has a suitable EIA been completed?	Y	

Committee Approval (Neonatal Guidelines Committee)			
If the committee is happy to approve this document, please complete the section below, date it and return it to the Policy (document) Owner			
Name of Chair	**M. S. Edwards**	**Date**	**1 March 2022**
Ratification by Management Executive (if appropriate)			
If the Management Executive is happy to ratify this document, please complete the date of ratification below and advise the Policy (document) Owner			
Date: n/a			